

CLAIMS

What is claimed is:

A method comprising:
forming a semi-crystalline polymer material into a lamella; and
stretching the lamella into a polymer comprising a node of folded
lamella and a fibril orientation;

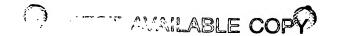
- 2. The method of claim 1, wherein stretching the lamella comprises stretching at a temperature of up to room temperature.
- 3. The method of claim 1, wherein prior to forming a lamella, the method comprises:

forming a pseudo-gel of semi-crystalline polymer material and a solvent.

- 4. The method of claim 3, wherein the semi-crystalline polymer material comprises an ultra-high molecular weight polyethylene.
- 5. The method of claim 4, wherein the solvent is selected from the group consisting of mineral oil and paraffin oil.
- 6. The method of claim 3, wherein prior to stretching the lamella, the method comprises removing a portion of the solvent.
- 7. The method of claim 1, wherein following stretching the lamella into a polymer, annealing the polymer at a temperature sufficient to define the node and fibril orientation.
- 8. A method comprising:

extruding a pseudo-gel comprising an ultrahigh molecular weight polyethylene material into a lamella;

stretching the lamella into a polymer comprising a node of folded lamella and a fibril orientation; and



annealing the polymer at a temperature sufficient to define the node and fibril orientation.

- 9. The method of claim 8, wherein stretching the lamella comprises stretching at a temperature of up to room temperature.
- 10. The method of claim 8, wherein prior to stretching the lamella, the method further comprises quenching the lamella sufficient to bring the temperature of the lamella below a melt temperature of the ultrahigh molecular weight polyethylene material.
- 11. The method of claim 8, wherein prior to extruding the pseudo-gel, the method comprises:

forming a pseudo-gel of ultrahigh molecular weight polyethylene material and a solvent.

- 12. The method of claim 11, wherein the solvent is selected from the group consisting of mineral oil and paraffin oil.
- 13. The method of claim 11, wherein prior to stretching the lamella, the method comprises removing a portion of the solvent.
- 14. The method of claim 11, wherein prior to forming the pseudo-gel, the method comprises, combining the ultrahigh molecular weight polyethylene material with the solvent, wherein the amount of the ultrahigh molecular weight polyethylene material is on the order of 5 to 30 percent by weight.
- 15. The method of claim 8, wherein the annealing temperature comprises a temperature above the crystalline melting point of the ultrahigh molecular weight polyethylene material.
- 16. The method of claim 8, wherein the annealing temperature is on the order of 147°C.

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17. An apparatus comprising:

a body portion formed of a dimension suitable for a medical device application and comprising a semi-crystalline polymer arrayed in a node of folded lamella and a fibril orientation.

- 18. The apparatus of claim 17, wherein the body portion comprises a catheter balloon.
- 19. The apparatus of claim 17, wherein the body portion comprises a film having dimensions suitable for a graft.
- 20. The apparatus of claim 17, wherein the polymer is selected from the group consisting of polyalkylene polymers, polyolefin polymers, and polyoxymethylene-acetyl co-polymers.
- 21. The apparatus of claim 17, wherein the polymer comprises ultra high molecular weight polyethylene.
- 22. The apparatus of claim 17, wherein the polymer has an auxetic property.

23. An apparatus comprising:

a body portion comprising an ultra-high molecular weight polyethylene material arrayed in a node of folded lamella and a fibril orientation.

- 24. The apparatus of claim 23, wherein the body portion comprises fibers of the ultra-high molecular weight polyethylene material.
- 25. The apparatus of claim 23, wherein the body portion comprises a film of the ultra-high molecular weight polyethylene material.
- 26. The apparatus of claim 24, wherein the body portion is formed of a dimension suitable for a medical device.

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- 27. The apparatus of claim 26, wherein the body portion comprises a catheter balloon.
- 28. The apparatus of claim 26, wherein the body portion comprises a film having dimensions suitable for a graft.
- 29. The apparatus of claim 24, wherein the polymer has an auxetic property.
- 30. The apparatus of claim 2, wherein the ultra high molecular weight polyethylene material comprises an internodal distance of 10 microns and 500 microns.